MASTER OF SCIENCE
IN
INFORMATION TECHNOLOGY MANAGEMENT

USING WEB-BASED TECHNOLOGIES FOR NETWORK MANAGEMENT TOOLS

Arie Agami-Major, Israeli Air Force
B.Sc., Ben-Gurion University, Beer-Sheva, Israel, 1989
Master of Science in Information Technology Management-June 1997
Advisor: Suresh Sridhar, Department of Systems Management
Second Reader: Rex Buddenberg, Department of Systems Management

This thesis examines the recent developments in the application of Internet technology to the field of network management. Network management has become increasingly important and even critical for large organizations. The current solutions offered by the main network management vendors are very expensive, demand a lot of training, and have been implemented only in a centralized paradigm of management. New solutions to current network management tools problems may be found in the increasingly popular World Wide Web, Internet tools such as Java, and remote database access through the Internet, as well as an established user interface, which can be easily learned. The main advantage of this paradigm shift is the ability to provide any user in the organization with information about the network, as well as the ability to allow authorized users to handle a network problem from any machine or location. These new methods are examined with regards to the requirements of an ideal network management system, and the feasibility of implementing these methods, given current network configuration. A web-based network management prototype implementing a configuration management tool is described. New network management protocols are also investigated.

PLRS AND EPLRS: A CASE STUDY IN SYSTEM DEVELOPMENT AND POST DEPLOYMENT SOFTWARE SUPPORT

Jon K. Aldridge-Major, United States Marine Corps
B.S., Western Illinois University, 1982
Master of Science in Information Technology Management, December 1996
Advisors: Martin J. McCaffrey, Department of Systems Management
Magdi Kamel, Department of Systems Management

Software development and acquisition have been the Achilles' heel within the Department of Defense for many years. In spite of considerable oversight and the control exercised by many regulations and standards, there still exists significant problems in cost, schedule, and delivered capability within programs. This thesis looks at the acquisition of two software and firmware intensive programs, the Position Location and Reporting System (PLRS) and the Enhanced PLRS (EPLRS). Its primary focus is the transition of life cycle management of the software to the government post deployment software support (PDSS) activity. The acquisition of PLRS by the U.S. Marine Corps involved the acquisition of an unprecedented new technology and system capability never before attempted. As a result, the configuration management, testing, and transfer of the software maintenance support functions caused considerable problems at the PDSS activity. A number of the lessons from this experience were applied to the acquisition and development of the Army's EPLRS resulting in a more thorough statement of contractual requirements for the contractor, better understanding of the configuration management by the government, and the testing of the system under more realistic conditions to validate its abilities. The recommendation of this thesis will result in a smoother acquisition process, a more mature system at time of delivery to the government, and a more capable

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WEB-BASED NETWORK MANAGEMENT TOOLS FOR U.S. NAVY MISSION-CENTRIC APPLICATIONS

Eric L. Andalis-Lieutenant, United States Navy
B.A., University of California, San Diego, 1989
Master of Science in Information Technology Management-September 1997
Advisor: Rex A. Buddenberg, Department of Systems Management
Second Reader: Suresh Sridhar, Department of Systems Management

The purpose of this thesis is to propose a Web-based interface solution to the Navy's mission-centric network management needs. A Web-based interface provides an easy to manipulate, universal client that can be accessed from any desktop that is connected to the Internet. A Web-based interface can be designed to show decision-makers and managers the status of network-centric information and how it affects the mission of Navy units.

This thesis also briefly describes basic network management techniques and the use of the Navy's Automated Digital Networking System (ADNS). As the Navy adopts a network-centric approach for every day business, including warfighting, network management becomes extremely critical. Commercial products can't fulfill all Navy specific requirements. The use of the Web is a solution to provide mission-centric network management information to the manager and decision-maker in an easy-to-use environment.

EXPLOSIVE ORDNANCE DISPOSAL ASSOCIATE- AN EXPERT SYSTEM FOR LANDMINE IDENTIFICATION

Paul J. Arcangeli-Captain, United States Army
B.S., North Georgia College, 1987
Master of Science in Information Technology Management-September 1997
Advisors: Nelson D. Ludlow, Department of Computer Science
Carl R. Jones, Department of Systems Management

Today there are over 110 million mines scattered across 60 countries, and these mines kill or injure more than 26,000 people annually. In order for deminers to remove these mines, they must be able to quickly and accurately identify them. Existing methods for landmine identification involve tedious searching through reference books.

This thesis presents an expert system for landmine identification, based on the set of thirty Bosnian mines from the MineFacts landmine database. The user is queried about the landmine, and heuristics are applied to the answers which are then used to calculate other information about the mine. This information is then filtered through decision trees to generate a small group of candidates which are displayed with a photo and confidence factor.

The system was modeled and tested using a Microsoft Excel spreadsheet. The system can narrow candidates to within two choices when all queries are correctly answered and to within three candidates when 70% of the queries are correctly answered. The results show that this technique has potential for all types of ordnance identification. A similar system could be implemented to cover all UXO for EOD use and as a reconnaissance tool by non-EOD trained individuals.

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A BUSINESS PROCESS MODEL AND REENGINEERING PLAN FOR THE STUDENT SERVICES DEPARTMENT OF THE MARINE CORPS INSTITUTE

Kurt A. Baden-Major, United States Marine Corps
B.S., United States Naval Academy, 1980
Master of Science in Information Technology Management-September 1997
and
Gerald A. Peters-Major, United States Marine Corps
B.S., United States Naval Academy, 1984
Master of Science in Information Technology Management-September 1997
Advisors: Magdi N. Kamel, Department of Systems Management
Mark E. Nissen, Department of Systems Management

This research is part of a year long project commissioned by the Marine Corps Institute to develop the architecture and supporting migration plan to transition from an existing legacy system to an open, client/server based relational database management system (DBMS) for the Student Services Department (SSD). The objective of this thesis is to develop the As-Is process model, redesign the processes to increase efficiency and reduce costs, and develop a To-Be process model to improve the current business processes. Additionally, data flow diagrams of the To-Be processes are developed to assist in prototype design and implementation. The DoD standard IDEF0 modeling technique is used for developing the process models. Implementation recommendations include: (1) adopting an ongoing reengineering strategy at MCI supported by the information Systems architectures, methodologies and CASE tools, and (2) utilizing a single database to facilitate data sharing among MCI departments, streamline processes, facilitate automaton, eliminate data redundancy, and improve customer service.

THE EFFECTIVENESS OF VIDEOTELETRAINING AS A LEARNING MEDIUM

Kevin L. Barrett-Lieutenant, United States Navy
B.S., Auburn University, 1988
Master of Science in Information Technology Management-December 1996
Advisors: Tung Bui, Department of Systems Management
James Suchan, Department of Systems Management

The Department of Defense (DoD) is implementing distance learning to augment and replace current military education and training programs.

Distance Learning (DL) methods using technology such as video teleconferencing (VTC) and the Internet are expected to provide immense cost and time savings when properly implemented and supported. Implementing a successful DL program requires a clear understanding of the unique interactions and characteristics of the technology, the environment, the roles of the instructor and students, and the appropriate instructional methods. Gaining a clear understanding of a successful program necessitates a framework to assess the effectiveness of distance learning programs. This research proposes a learning effectiveness model for distance learning. Model constructs include the learning effectiveness of instructor/students, interactivity, organizational characteristics, goals and technology. These constructs form the basis for the distance learning model. Three Naval Postgraduate School (NPS) DL courses are analyzed using the model to illustrate its flexibility and predictive nature. This analysis showed that the model's constructs interact to produce a system that supports a complex relationship. Interactions between technology, the environment, instructional techniques, student effectiveness combine to produce different outcomes. Feedback is an important system mechanism that allows verification that the course learning objectives are being achieved.

GLOBAL BROADCAST SERVICE FOR THE EXPEDITIONARY WARRIOR

Elizabeth S. Birch-Captain, United States Marine Corps
B.B.A., University of New Mexico, 1984
M.B.A., National University, San Diego, 1995
Master of Science in Information Technology Management-June 1997
Advisors: Paul H. Moose, Command, Control, and Communications Academic Group
Douglas Brinkley, Department of Systems Management

The battlefield has changed tremendously during the past decade due to major technical innovations. These changes have resulted in a requirement for high-speed, multimedia communications and greater bandwidth capabilities. Global Broadcast Service (GBS) technology is a military application of the commercial system Direct TV and is one way the military can address the need for greater bandwidth. Many of the two-way systems in the MILSATCOM architecture could be relieved of their burden by use of GBS. This thesis focuses on the Marine Corps and how its decision-makers can integrate GBS into the existing communications architecture. This is illustrated by using a Marine Expeditionary Unit as an example. This technology meets the warfighters need to have a high data rate, high volume information transfer available. Crucial to the successful integration of GBS into the communications architecture is ensuring that the MEU command ships, and other amphibious vessels in the Amphibious Ready Group, are equipped with the GBS receive suites during MEUs workup and deployment cycle. Finally, command and control issues are discussed and how GBS can expedite the decision making process.

MODELING ORGANIZATIONAL CONFIGURATION AND DECISION PROCESSES FOR INFORMATION WARFARE ANALYSIS

Bruce J. Black-Lieutenant, United States Navy
B.S., United States Naval Academy, 1989
Master of Science in Information Technology Management-March 1997
Advisors: Carl R. Jones, Department of Systems Management
Nancy Roberts, Department of Systems Management

For an organization to survive it must be able to adapt to its environment. A military organization operates in an environment that is constantly changing. The ability to model organizational configurations and organizational decision processes can assist the commander in adapting to the environment and understanding how a military organization is susceptible to Information Warfare (IW) attacks. First a commander must understand the concepts of Information Warfare Command and Control and the concept of organizational decision processes and how these permit an organization to adapt to its environment. Then the commander must determine what level of detail is necessary to model the organizational decision processes for its environment. Next the commander must analyze his model for configuration and decision processes. Using such commercially available software as Organizational Consultant and VDT the commander can identify any organizational misfits to the environment and the IW attack susceptibilities of the organizational decision processes. In the end, this approach demonstrates that it is feasible to model organizational configuration and organizational decision processes in an Information Warfare environment.

SUPPORTING DECISION AND NEGOTIATION IN AN INTERNET ENVIRONMENT: AN EXPERIENCE WITH NEGOTIATOR/I

Kimberly S. Blood-Lieutenant, United States Navy
B.A., Xavier University, 1986
Master of Science in Information Technology Management-March 1997
and
Joseph G. Garcia-Captain, United States Army
B.S., College of Santa Fe, 1987
Master of Science in Information Technology Management-March 1997
Advisors: Tung X. Bui, Department of Systems Management
Balasubramaniam Ramesh, Department of Systems Management

The purpose of this thesis is to explore implementation of decision support on the Internet. The tremendous growth and popularity of the Internet presents researchers with opportunities to deploy DSS across geographic boundaries. To identify the requirements of an Internet-based DSS, this thesis discusses four traditional decision making models. The information collected from these models is applied to the creation of an Internet-based DSS. These models are the decision-making model, problem solving model, creative thinking model, and the negotiation model. From an implementation point of view, this thesis develops a prototype decision support system for negotiation using Java. Realization of the prototype suggests that a decision support system (DSS) can be implemented using Java provided the DSS meets certain design parameters.

ANALYSIS, DESIGN, AND IMPLEMENTATION OF A DATABASE MANAGEMENT SYSTEM FOR GENERATING TECHNICAL/MEDICAL REPORTS BY CHIROPRACTORS

Rodney A. Boiling-Lieutenant, United States Navy Reserve
B.S., Florida A&M University, 1989
Master of Science in Information Technology Management-September 1997
Advisors: Tung X. Bui, Department of Systems Management
Balasubramaniam Ramesh, Department of Systems Management

A medical center specializing in chiropractic care is burdened with the enormous task of managing numerous patient's records, preparing error free billing statements, and writing official business/medical reports. This task requires increased attention of staff personnel. The burden of paper file management could be lessened through automation of record keeping, while increasing accuracy, efficiency, and effectiveness. Valuable time for the providers and secretary could be saved through elimination of excessive paperwork which they are required to prepare.

Based on the staff requirements, this thesis designs and implements a database management system. The primary objective is to automate the current manual system to allow providers to generate official medical reports. In addition to, this system will also store, sort, and compare data relevant to all patients while minimizing the need to maintain hard copy files. The Chiro Pro 97 (CP97) Database system is designed using Microsoft Access 97.

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MILITARY APPLICATIONS OF INTRANET TECHNOLOGY: FLEET NUMERICAL METEOROLOGY AND OCEANOGRAPHY CENTER

Charles W. Booth-Commander, United States Navy
B.S., United States Naval Academy, 1980
Master of Science in Information Technology Management-September 1997
and
Barbara J. Gutsch-Lieutenant, United States Navy
B.S., Arizona State University, 1984
M.B.A., New Hampshire College, 1989
Master of Science in Information Technology Management-September 1997
Advisors: James C. Emery, Department of Systems Management
Frank J. Barrett, Department of Systems Management

Intranets are rapidly becoming a corporate internal information-sharing medium. Intranet technology is the same robust, proven, industry standard technology that is used on the Internet. The technical aspects of implementing the technology are simple. The organization and management aspects are significant and are key to its successful implementation. This internal use of Internet technology is easy, inexpensive, and has produced savings and benefits for corporate organizations.

This thesis reviews corporate and government intranets and examines the feasibility of implementing this technology and benefiting from it, in a military organization. Specific applicability of intranet technology was examined at Fleet Numerical Oceanographic and Meteorology Center, while maintaining the vision of its applicability to other military organizations. Fleet Numerical Oceanographic and Meteorology Center has the requisite technical and organizational infrastructure necessary to successfully implement intranet technology. The management and technical skill sets necessary to successfully implement this technology at any military command operating a computer network should be available, or easily trained. Fleet Numerical Oceanographic and Meteorology Center and the U.S. Military should establish the organizational plans and infrastructure to implement and exploit this empowering information sharing medium.

APPLYING TECHNOLOGY TO MARINE CORPS DISTANCE LEARNING

Michael G. Broihier-Major, United States Marine Corps
B.A., Rutgers College, 1984
Master of Science in Information Technology Management-September 1997
Advisors: Alice M. Crawford, Department of Systems Management
Hemant Bhargava, Department of Systems Management

The purpose of this thesis is to investigate the application of technology to distance learning with the intention of recommending to the Marine Corps a feasible migration path away from its current correspondence program. Currently, the Marine Corps Institute (MCI) administers correspondence courses for both Occupational Skill Development (OSD) and Professional Military Education (PME). Automating and streamlining MCI processes is insufficient considering the pivotal importance distance learning plays in a Marine's career. Current application of technology to distance learning in education, business, and the military is discussed in light of information obtained through interviews, site visits, conferences, and the literature. A non-exhaustive list of tangible and intangible costs and benefits related to various distance learning technologies is provided, as well as a template for a distance learning decision making -process. The process can be used with decision support software to match requirements to technology and select appropriate migration paths through cost benefit analysis. This thesis recommends applying asynchronous methods to OSD courses and a combination of synchronous and asynchronous methods to PME courses. Finally, this thesis recommends changing the current structure and mission of MCI and consolidating its efforts with the College of Continuing Education under the Marine Corps University.

TECHNOLOGICAL AND ECONOMIC ASSESSMENT OF TELEMEDICINE: AN EXAMPLE OF DOD MEDNET IN REGION THREE

Kirk L. Buker-Lieutenant, United States Naval Reserve
B.B.A., M.A., National University, 1989, 1990
Master of Science in Information Technology Management-September 1997
Advisor: Tung Bui, Department of Systems Management
Second Reader: William J. Haga, Department of Systems Management

The Department of Defense (DoD) has numerous initiatives underway to improve the health care delivery system within the military. Telemedicine is one of these initiatives that combine images, videos, sounds, and text to enhance the health care providers' ability to diagnosis and treat patients. The Secretary of the Army in October 1994 established the Center for Total Access as a laboratory for healthcare re-engineering in the military. This thesis is provided as a resource guide to inform those who may become involved with this complex and chaotic field of telemedicine by providing a review of state-of-the-art technology that can support delivery of telemedicine, and by proposing a cost benefit framework for telemedicine configuration design. The material for this thesis was primarily researched utilizing Internet web browsing technologies. A review of the In-Service Infrastructure Management Program Office (TIMPO) project (MEDNET) is outlined as working example of a large regional telemedicine/ telehealth system which was found to be the most revealing in the study of telemedicine.

CONNECTIVITY FOR UNDERWAY COAST GUARD PATROL BOATS

Gregory C. Busch-Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1986
Master of Science in Information Technology Management-June 1997
Advisor: Suresh Sridhar, Department of Systems Management
Second Reader: Rex Buddenberg, Department of Systems Management

This thesis examines the U.S. Coast Guard patrol boat's ability to effectively exchange operational data while underway. The patrol boat is currently unable to obtain tactical law enforcement information from the central Law Enforcement Information System II (LEIS II) database while on patrol. LEIS II provides access to law enforcement information from Coast Guard, FBI, and state and local law enforcement agencies. Availability of this information will alert the boarding team of potentially dangerous situations and heighten their awareness during the boarding, allowing for a safer boarding.

This thesis evaluates the current state of the patrol boat's communication system and recommends a solution to its current needs. Current and proposed satellite communication systems are evaluated using the Analytic Hierarchy Process (AHP). Pairwise comparisons are made of multiple decision criteria and the alternatives to obtain a recommended solution.

The conclusion of this study is that the patrol boat's future requirements will far exceed the bandwidth available from current satellite systems. Broadband mobile communication systems such as Teledesic and Spaceway are currently under development and show promise. Until broadband service is available, Iridium should be adopted as the solution to the patrol boat's current needs.

RE-ENGINEERING DOD THROUGH ENTERPRISE-WIDE MIGRATION TO OPEN SYSTEMS

Robert A. Cameron-Lieutenant, United States Navy
B.S., United States Naval Academy, 1990
Master of Science in Information Technology Management-September 1996
and
Kenneth G. Carrick-Captain, United States Army
B.S., United States Military Academy, 1986
Master of Science in Information Technology Management-December 1996
Advisors: James C. Emery, Department of Systems Management
Barry Frew, Department of Systems Management

The Department of Defense cannot afford to develop and deploy information systems that have no growth potential. Legacy systems must be replaced with flexible, highly interoperable systems that produce high residual values. With shrinking budgets, depreciation of existing hardware, and rising maintenance of legacy systems, organizations must deploy systems that are capable of evolving with changing business requirements.

The Department of Defense enterprise vision for information management (IM) emphasizes integration, interoperability, flexibility, and efficiency through the development of a common, multi-purpose, standards-based technical infrastructure. This vision requires a new paradigm for building information systems.

The new paradigm relies on open systems, which make it easier, less expensive, and faster to develop and change applications and to employ new technology features. This research examines open systems and provides a strategy for organizations to migrate to them. A case study of the Naval Postgraduate School illustrates the strategy. Provisionally, a prototype application models the desired characteristics of an open system.

TESTING EFFECTIVENESS OF GENETIC ALGORITHMS FOR EXPLORATORY DATA ANALYSIS

Jason W. Carter-Lieutenant, United States Navy
B.S., University of Missouri-Rolla, 1990
Master of Science in Information Technology Management-September 1997
Advisor: Hemant K. Bhargava, Department of Systems Management
Second Reader: William J. Haga, Department of Systems Management

Heuristic methods of solving exploratory data analysis problems suffer from one major weakness - uncertainty regarding the optimality of the results. The developers of DaMI (Data Mining Initiative), a genetic algorithm designed to mine the CCEP (Comprehensive Clinical Evaluation Program) database in the search for a Persian Gulf War syndrome, proposed a method to overcome this weakness: reproducibility — the conjecture that consistent convergence on the same solutions is both necessary and sufficient to ensure a genetic algorithm has effectively searched an unknown solution space. We demonstrate the weakness of this conjecture in light of accepted genetic algorithm theory. We then test the conjecture by modifying the CCEP database with the insertion of an interesting solution of known quality and performing a discovery session using DaMI on this modified database. The necessity of reproducibility as a terminating condition is falsified by the algorithm finding the optimal solution without yielding strong reproducibility. The sufficiency of reproducibility as a terminating condition is analyzed by manual examination of the CCEP database in which strong reproducibility was experienced. Ex post facto knowledge of the solution space is used to prove that DaMI had not found the optimal solutions though it gave strong reproducibility, causing us to reject the conjecture that strong reproducibility is a sufficient terminating condition.

NETWORK MANAGEMENT PRACTICES:AN EMPIRICAL ANALYSIS

Timothy A. Cauthen-Lieutenant, United States Navy
B.S., Auburn University, 1990
Master of Science in Information Technology Management-September 1997
and
Kristine M. Davis-Lieutenant, United States Navy
B.S., United States Naval Academy, 1989
Master of Science in Information Technology Management-September 1997
Advisor: Suresh Sridhar, Department of Systems Management
Second Reader: Tung Bui, Department of Systems Management

As organizations continue migrating mission critical applications and business processes to distributed computing environments, network utilization and the number of bandwidth-intensive applications will continue increasing. Costly network infrastructure upgrades are forcing organizations to explore alternative management methodologies for addressing bandwidth congestion control. In an era of stagnant budgets and increasing IT requirements, DoD is no exception. The enactment of the Information Technology Management Reform Act of 1996 mandates investigating cost-effective ways of managing 21st Century network resources.

This thesis reviews traditional computing resource management and how resource management has changed with the addition of bandwidth as a decision variable. It then investigates current network management practices determined from a sample of business-sector organizations, academic institutions, and military installations, focusing on prioritization and chargeback as bandwidth controls. It then examines the future of prioritization and chargeback technologies and their potential impact on future DoD network operations.

IMPLEMENTATION ISSUES FOR THE INITIAL DEPLOYMENT OF THE PERFORMANCE AND CALIBRATION MODULES OF THE MK 92 MOD 2 FIRE CONTROL SYSTEM MAINTENANCE ADVISOR EXPERT SYSTEM

Robert J. Cepek-Lieutenant, United States Navy
B.S., United States Naval Academy, 1989
Master of Science in Information Technology Management-December 1996
Advisors: Magdi N. Kamel, Department of Systems Management
Martin J. McCaffrey, Department of Systems Management

The MK 92 Mod 2 Fire Control System (FCS) is a complex, maintenance intensive shipboard weapon system found primarily aboard the Oliver Hazard Perry class guided missile frigates (FFG-7). This system, based on 1970's technology, frequently requires extensive troubleshooting and supplemental support from shore-based technical experts. A maintenance advisor expert system (MAES) is being developed by the Port Hueneme Division of the Naval Surface Warfare Center (NSWC-PHD) and the Naval Postgraduate School (NPS) to assist the Fire Control technicians aboard ship to better isolate faults in the MK 92 Mod 2 FCS.

This thesis furthers the efforts of the project at NPS by investigating key implementation issues that will affect the deployment of the initial version of MAES to the fleet. Additional deployment issues addressed in the thesis include incorporating lessons learned from deploying other expert systems in the armed forces, gaining support from individual chains of command, training MAES users effectively, involving MAES users in the implementation process, and changing hardware implementation issues. A training plan, implementation plan, and updated MAES user's manual for the initial deployment are included.

CLASSIFICATION, SEARCH, AND RETRIEVAL IN A MULTI-VARIABLE, MULTI-LEVEL TAXONOMY: APPLICATION TO DECISIONNET

Christopher M. Corgnati-Lieutenant, United States Navy
B.S., Villanova University, 1990
Master of Science in Information Technology Management-September 1997
Advisor: Hemant Bhargava, Department of Systems Management
Second Reader: Gordon Bradley, Department of Operations Research

The explosion of information available on global computer networks underlines the need for effective repositories that facilitate organization of, and search for, information. These digital repositories may contain simple data, or increasingly, objects of other types such as software and decision models. A taxonomy can be thought of as a navigational aid to a repository. Organization of objects may take place along multiple dimensions, each of which may have a taxonomy of classification terms that spans many levels.

This thesis examines the design and development of a WWW based Classification, Registration, Search, and Retrieval System. The system was applied and tested on the DecisionNet project which is an electronic brokerage house for decision technologies. In order to facilitate user interaction via the WWW the system was designed to be run through a standard web browser. A graphical user interface was developed in Java. The back-end functions for data management, search and retrieval were also programmed largely in Java.

A FAULT MANAGEMENT SYSTEM (FMS) ARCHITECTURE FOR THE NAVAL COMPUTER AND TELECOMMUNICATIONS AREA MASTER STATIONS (NCTAMS)

Kathleen M. Creighton-Lieutenant, United States Navy
B.B.A., University of Notre Dame, 1988
Master of Science in Information Technology Management-September 1997
Advisors: Carl R. Jones, Department of Systems Management
William J. Haga, Department of Systems Management

The Joint Fleet Telecommunications Operations Center (JFTOC) acts, on behalf of the Naval Computer and Telecommunications Command, as the fleet's "one-stop shop" for information services. Effective fault management is vital to ensuring reliable network service. Currently, however, the JFTOC employs a Fault Management System (FMS) that consists primarily of manual processes and non-networked resources. Users require a system that provides a centralized and accessible source of near-real time fault management information.

This thesis uses the methodology of the Department of Defense (DoD) Technical Architecture Framework for Information Management (TAFIM). TAFIM outlines a structured approach for migrating legacy systems to a open systems, standards-based target architecture.

Through application of the TAFIM process, a target FMS architecture, termed HelpDesk On-Line Information System (HOLIS), is developed. HOLIS includes: the existing NCTAMS classified local area network and SIPRNet infrastructure; network operating system, office automation, e-mail and database software from the interim Navy Automated Information System Standards list; and commercial off-the-shelf help desk software. Four migration paths are outlined, and one is selected as the best option for moving from the baseline system to the target FMS.

DATA WAREHOUSING AND DATA QUALITY FOR A SPATIAL DECISION SUPPORT SYSTEM

Robert Williamson Dill-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Information Technology Management-September 1997
Advisors: Daniel R. Dolk, Department of Systems Management
George W. Thomas, Department of Systems Management
Kathryn Kocher, Department of Systems Management

This research investigates the problems inherent in Decision Support Systems (DSS) that depend on the quality and accuracy of legacy information as the basis for decision-making. A Spatial Decision Support System (SDSS) was developed at Naval Postgraduate School to analyze the comparative desirability of Army Reserve Unit locations. The Army Reserve Installation Evaluation System (ARIES) integrates a GIS mapping engine and a decision model solver in a flexible environment that leverages operational legacy database information for decision-making.

Data quality problems from legacy sources motivated the development of a data migration plan to transform the source data into an architecture optimized for the ARIES SDSS application. This research developed a prototype Data Migration Tool (DMT) to extract the relevant source data into a centralized repository for the SDSS with an acceptable degree of data quality to support SDSS outcomes. Six data quality attributes were identified: accuracy, completeness, consistency, timeliness, uniqueness, and validity. The ARIES DMT focused on data validity and developed techniques for measuring and enforcing data validity. The DMT also specified individual responsibilities for data administration, development of data retrieval routines, and data quality assessment.

Significant system performance enhancements resulted from implementation of the DMT by leveraging the spatial aspects of the underlying repository through geographic queries that efficiently localized subsets of the data files. Additional performance enhancements were obtained through the use of data warehousing techniques.

A SYSTEM ARCHITECTURE AND MIGRATION PLAN FOR THE STUDENT SERVICES DEPARTMENT OF THE MARINE CORPS INSTITUTE

Clayton O. Evers, Jr.-Major, United States Marine Corps
B.A., University of Florida, 1984
Master of Science in Information Technology Management-September 1997
Advisors: Magdi Kamel, Department of Systems Management
Mark Nissen, Department of Systems Management

This thesis is part of a year Tong project that was undertaken by NPS students and faculty to develop a system architecture and migration plan for the transition from a legacy information system to a client/server based, open information system for the Marine Corps Institute (MCI). The primary objective of this thesis is to develop the technology architecture required to support the information systems of the Student Services Department (SSD) of MCI and to address the complex issues of system migration.

This thesis conducts an analysis of existing hardware and software, defines a technology architecture that will support the operational requirements of the data and business process model developed by other team members, and proposes a migration plan to transition from the current architecture to the proposed architecture that addresses both technical and human factor issues.

The thesis culminates in specific recommendations for MCI with regard to the hardware, software, and migration issues.

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ARIES: AN ARCHITECTURAL IMPLEMENTATION OF A MULTI-CRITERION SPATIAL DECISION SUPPORT SYSTEM (SDSS)

Peter Ralph Falk-Lieutenant, United States Navy
B.S., Illinois Institute of Technology, 1988
Master of Science in Information Technology Management-September 1997
Advisors: Daniel R. Dolk, Department of Systems Management
LCDR Dale M. Courtney, Computer and Information Services

This thesis describes a component-based methodology for developing a new class of Systems called spatial decision support systems (SDSS). The methodology is presented within the context of the development of the ARIES (Army Reserve Installation Evaluation System) software application, an SDSS designed to evaluate and compare site desirability for Army Reserve unit locations. The ARIES SDSS consists of a flexible component-based architecture that seamlessly integrates a user interface, GIS, multi-criteria decision model with associated DSS, and data warehouse.

To build the SDSS, the ARIES developers introduced a new architectural paradigm, undertaking a collaborative approach with U.S. Army Reserve Command (USARC) decision-makers to rapidly prototype ARIES using component-based technologies. The developers implemented several domain-specific architectures using a formalized proof-of-concept heuristic, Concept-to-Code (C2C), which conceptualizes user requirements in architectural terms, and migrating legacy data sources into a spatial data warehouse.

C2C allowed the resultant ARIES application to be conceptualized initially in general terms, and then specialized architecturally around existing off the shelf components, as design requirements were collaboratively prototyped and implemented within the existing USARC information system infrastructure. C2C facilitated the complete development of a complex, map-based system and accompanying data warehouse in the span of a few months with a technical team of three analysts and programmers. Significant system performance gains resulted from instituting a Migration Architecture System (MARS) engine to extract and spatially enable relevant data sources for geographic querying. Additional performance enhancements were also obtained through the use of rapid, component-based development techniques.

EVALUATING MARINE CORPS JRISS EFFECTIVENESS: A TRIANGULATED QUASI-EXPERIMENT

Carl Felton-Major, United States Marine Corps
B.S., Florida State University, 1985
Master of Science in Information Technology Management-September 1997
and
Lloyd Hamashin-Major, United States Marine Corps
B.S., University of Pittsburgh, 1982
B.S., Allegheny College, 1982
Master of Science in Information Technology Management-June 1997
Advisors: William J. Haga, Department of Systems Management
Frank J. Barrett, Department of Systems Management

This thesis assesses the effectiveness of the Marine Corps's prototype implementation of the Joint Recruiting Information Support System (JRISS). It employs a quasi-experimental data collection design with pre-implementation and post-implementation data collection from a sample of Marine recruiters divided into a statistically equivalent experimental and control groups. Data sources were triangulated with behavioral data taken from archival records on three key indicators of recruiting production, while attitudinal data were approximated with a questionnaire whose items were reduced to four factors through principal components analysis. Ethnographic data were gathered through intensive interviews with the sample of Marine recruiters. This thesis is the first instance, m the IT academic literature, of a quasi-experiment with triangulated data sources used to test IT system effectiveness. The institutional rotation of military recruiters forced the gathering of post-implementation behavioral and attitudinal data before the full impact of JRISS could evolve. Discourse analysis of interview transcripts yielded 17 social insights into user construction of JRISS. Implications are drawn for the empirical evaluation of IT system success. Twelve specific recommendations are made for modifications and improvements to JRISS.

PROTOTYPE FOR ENHANCEMENT OF ANVIS/HUD CBT INSTRUCTION THROUGH THE USE OF EMBEDDED VISUAL SIMULATION

G. Thomas Foggin, IV-Lieutenant, United States Navy
B.S., United States Naval Academy, 1989
Master of Science in Information Technology Management-September 1997
and
Paul J. O'Rourke-Lieutenant, United States Navy
B.S., Rochester Institute of Technology, 1989
Master of Science in Information Technology Management-September 1997
Advisors: Anthony Ciavarelli, School of Aviation Safety
Tung Bui, Department of Systems Management

The purpose of this project is to develop a computer based trainer (CBT) for ANVIS/HUD that takes advantage of recent advances in multimedia technology. Integration of a head-mounted display (HMD) into the CBT system allows the user to be immersed into a virtual world that simulates actual NVG use. In accordance with guidelines established by Ciavarelli, Baer and Sengupta, in their NVG Training Technology Report, December 1994, for the Naval Air Systems Command (PMA 205) and using Macromedia Director 6.0, it is possible to incorporate a synthesized continuous multimedia data base into a system that permits user interaction along a scripted NVG flight path. The system has the capability of demonstrating some of the capabilities and limitations of an actual ANVIS/HUD system under user selectable lighting and terrain features. By utilizing commercial-off-the-shelf (COTS) software and hardware the system represents a possible low cost, personal computer (PC) based, ANVIS/HUD trainer.

INSTRUCTIONAL DESIGN OF COMPUTER-BASED TRAINING

Robert W. Foster-Lieutenant Commander, United States Navy
B.S., University of Florida, 1984
Master of Science in Information Technology Management-December 1996
and
Alfred B. Price, Jr.-Lieutenant, United States Navy
B.S., Southern University, 1988
Master of Science in Information Technology Management-December 1996
Advisors: Tung Bui, Department of Systems Management
Anthony Ciavarelli, School of Aviation Safety

The goal of this research is to combine the principles of instructional design and computer technology in order to produce a multimedia computer-based trainer for the Aviation Night Vision Image System and Heads-up Display (ANVIS/HUD). The technological advances in night vision goggles like the ANVIS/HUD system have permitted aircrews to accomplish numerous night mission tasks which they were not previously capable of completing. Increase in mission tasking requires the operators of the ANVIS/HUD system to obtain a large amount of ANVIS/HUD training to ensure safety of personnel and equipment as well as mission success.

The Department of the Navy's training budget is being reduced and the need for unconventional training methods to augment the cockpit and classroom is essential. The use of computer-based training provides the technology to achieve this training requirement. By providing a means to apply innovative instructional design principles and multimedia computer technology, the training of the war-fighters is expected to be accomplished both effectively and efficiently thus saving lives and money.

INTERNETWORKING: AIRBORNE MINE COUNTERMEASURES C41 INFORMATION SYSTEMS

Steven Mitchell Graves-Lieutenant, United States Navy
B.S., United States Naval Academy, 1988
Master of Science in Information Technology Management-December 1996
Advisors: Don Brutzman, Undersea Warfare Academic Group
Rex A. Buddenberg, Department of Systems Management

Airborne Mine Countermeasures (AMCM) Command Control Communication Computer and Intelligence (C41) baseline currently consists of stand-alone tactical decision aids. Information such as aircraft position, equipment status, and abbreviated mine like contact reports cannot be transferred in any form other than voice from/to the MH-53E helicopters while conducting Airborne Mine Countermeasures operations. There are currently no methods to transfer sonar video or single-frame imagery of mine-like objects between any Mine Warfare (MIW) units in a near-real time manner. Delays lasting several hours are frequently encountered before the results of a "rapid reconnaissance" airborne minehunting mission are made available to the rest of the fleet and/or MIW community. In order to improve command and control, the AMCM Mine Warfare community must integrate all of its C41 assets onto a tactical internet.

This thesis presents a tactical internet for AMCM with an open, standards-based modular architecture. It is based on the TCP/IP network model using common protocols and interfaces. Command and control will significantly improve as this network will provide a methodology to transfer critical information between AMCM C41 assets and tactical networks worldwide. Results from a comprehensive laboratory prototype demonstration using commercial off-the-shelf (COTS) equipment are presented along with lessons learned. Laboratory results show that this system works and can be deployed for testing at sea.

GARRISON BASED INTRANET PROTOTYPE FOR THE 40TH INFANTRY DIVISION (MECHANIZED)

Nelson T. Heckroth-Major, United States Marine Corps
B.A., Oregon State University, 1985
Master of Science in Information Technology Management-September 1997
and
Thomas M. Olson-Major, United States Army
B.S., South Dakota State University, 1983
Master of Science in Information Technology Management-March 1998
Advisors: Suresh Sridhar, Department of Systems Management
Second Reader: Tung Bui, Department of Systems Management

This thesis introduces the concept of an Intranet, chronicles the efforts required to create and deliver an Intranet, and provides a discussion of advantages and disadvantages of using an Intranet. It demonstrates that an Intranet can be a useful mechanism to solve problems related to information control and distribution for the reserve component of the 40th Infantry Division (Mechanized).

The thesis contains a detailed description of the rapid prototyping process model, as well as the modifications required to adapt the process for Intranet development. Further, it describes the gathering of system requirements using the results of several structured walk-throughs. It also describes, in detail, the development efforts to address each of the requirements identified.

The prototype developed as part of this thesis demonstrates several key aspects of Intranet development and deployment. For example, it incorporates webpage development using commercial-off-the-shelf products common to the division, and the development of interactive functions with spreadsheet and database programs. This thesis also addresses issues such as security and content control which are crucial for Intranet deployment.

DEVELOPMENT OF GRAPHICAL USER INTERFACE STANDARDS AND PROTOTYPE FOR THE STUDENT SERVICES DEPARTMENT OF THE MARINE CORPS INSTITUTE

Gerald L. Hehe-Lieutenant Commander, United States Navy
B.S., Northern Arizona University, 1981
Master of Science in Information Technology Management-September 1997
Advisors: Magdi N. Kamel, Department of Systems Management
LCDR Dale Courtney, Computer and Information Services

This research supports a year long Marine Corps Institute project initiated to migrate from a closed non-relational legacy system to an open client/server system architecture in response to many identified shortcomings of the current information system used by the Student Services Department. The objectives of this thesis are: (1) to identify a set of Graphical User Interface (GUI) guidelines for application development, (2) design and develop a proof-of-concept prototype that demonstrates the functionality of a relational database management system, and (3) exercise usability testing to validate the prototype functionality. Additionally, an object oriented visual development tool is used to develop the prototype application based on process and data modeling constructs. Implementation recommendations include: (1) adopting a continuous application development strategy based on modern concurrent process and data modeling constructs, (2) utilizing an object oriented visual development tool that compliments the target relational database management system, (3) utilizing the GUI guidelines identified during this research for future application development, and (4) applying usability testing to validate application functionality prior to implementation.

A SURVEY OF SOFTWARE FOR DECISION ANALYSIS

Craig L. Herrick-Lieutenant Commander, United States Navy
B.S., Old Dominion University, 1985
Master of Science in Information Technology Management-March 1997
Advisors: Hemant Bhargava, Department of Systems Management
Suresh Sridhar, Department of Systems Management

There are an increasing number of desktop decision support Systems (DSS) generators available which can assist a manager in making decisions. The low cost of these packages also make them ideal instructional tools in academic courses covering decision analysis. Using literature review, surveys, correspondence and program inspection, this thesis demonstrates the features which are required of a good DSS as they relate to three potential uses: production, education, and demonstration.

This thesis discusses the characteristics a prospective user should consider when selecting a DSS. These characteristics include features such as the user interface, data and modeling support systems and the level of support available from the vendor. Following this, the thesis reviews the “state of the art” in currently available programs.

The programs reviewed in this thesis are easy to use and provide valuable tools for decision making. The programs lack in their ability to import and export data to other applications which limits their usefulness in a production setting, however, desktop DSS offer managers a sophisticated, yet easy to use, application which can improve decision making and benefit organizations at all levels.

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

APPLIED RELIABLE MULTICAST USING THE XPRESS TRANSPORT PROTOCOL (XTP)

George S. Johnstone-Lieutenant, United States Navy
B.U.S., University of New Mexico, 1989
Master of Science in Information Technology Management-March 1997
and
Glenn D. Williams-Lieutenant, United States Navy
B.A., University of Colorado, 1990
Master of Science in Information Technology Management-March 1997
Advisors: W. Timothy Strayer, Sandia National Laboratories
Rex Buddenberg, Department of Systems Management

Reliable multicast protocols provide a means to deliver data from one sender to many receivers with assurance. Reliable multicast is better suited than unicast for the bandwidth restricted, high error rate, hostile communications environment found in the military's tactical arena. General purpose protocols ensure adaptability to the variety of communications suites currently used by the military. As well, any acceptable multicast protocol must support varying levels of assurance, from unreliable delivery to full reliability.

This thesis evaluates the performance capabilities of one implementation of the Xpress Transport Protocol— SandiaXTP, which is a reliable multicast transport protocol. Four experiments are run on a testbed consisting of four Sun SPARC4 workstations. These experiments look at unicast and multicast transmissions with varying numbers of induced errors. The included performance measurements examine the various challenges present in a communications medium subject to attack. The results demonstrate that reliable multicast in a tactical environment is possible.

ARMING OUR NAVAL OFFICERS WITH TOMORROW'S TECHNOLOGY- ISSUING LAPTOP COMPUTERS TO ALL NAVAL OFFICERS

Christi-Lynn Jones-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1986
Master of Science in Information Technology Management-September 1997
Advisors: Nelson Ludlow, Department of Computer Science
CDR Jim Kerber, Department of Systems Management

Information superiority is the foundation for Joint Vision 2010 and the method for services to dominate the battlefield. The goal of IT21 is to rapidly implement a warfighting information network. To facilitate the engagement of information warfare, this thesis proposes that all officers be issued a laptop computer.

This thesis discusses how a computer can be as valuable as a rifle or a tank, and possibly change the way the Department of Defense fights wars. With a laptop computer, officers can have 24-hr access to critical information - turning all Naval Officers into Information Warriors! When officers transfer, they will be immediately on line at their new duty station.

This thesis uses the Technical Architecture for Information Management (TAFIM) model for strategic planning and evaluates three migration paths: a paycheck computer allowance; continuing buying desktop computers within individual command budgets; and leasing laptop computers. The alternatives are evaluated using an Information Technology Assessment Worksheet This thesis recommends that the best alternative is to lease computers for all officers and have Naval Information Systems Management Center (NISMC) be the program manager. This thesis clearly shows that after a three-year period the cost of leasing a computer is more economical than purchasing a computer.

UTILIZING WEB-BASED TECHNOLOGY TO DESIGN AND IMPLEMENT A CONFERENCE INFORMATION SYSTEM

Todd M. Kinney-Lieutenant Commander, United States Navy
B.A., Wabash College, 1986
Master of Science in Information Technology Management-September 1997
Advisors: Monique P. Fargues, Department of Electrical and Computer Engineering
Second Reader: Rex A. Buddenberg, Department of Systems Management

This thesis is a follow-on effort to work conducted by Michael Chalfant and Kevin Coats. The focus is the design and implementation of a web-based information system for the Asilomar Conference on Signals, Systems and Computers. This technical conference specializes in signal and image processing, communications, sensor systems, and computer hardware and software. Organized in collaboration with the Naval Postgraduate School, San Jose State University, and the IEEE Signal Processing Society, the Conference is conducted annually at the Asilomar Conference Facility in Pacific Grove, California. Initial project efforts concentrated on article submissions and system administration (i.e., database management). The article review process and overall implementation of the improved system is the focus of this thesis.

The objectives of this thesis are to: 1) analyze the article review process of the Asilomar Conference, 2) implement a World Wide Web (WWW) based article review process, and 3) implement the improved Asilomar Conference information system. Internet automation is accomplished via interactive WWW pages, created using Borland's Delphi as a programming tool, O'Reilly's WebSite as the web server, and Common Gateway Interface scripts as the mechanism for interactivity. This interactivity provides seamless global access to the Conference database and processes.

ANALYSIS, DESIGN, AND IMPLEMENTATION OF A WEB-BASED TRAINING SYSTEM FOR MULTI-CRITERIA DECISION SUPPORT, INTEGRATING HYPERTEXT, MULTIMEDIA-BASED CASE STUDIES AND TRAINING SOFTWARE

Donald E. Klein-Lieutenant, United States Navy
B.S., University of Wisconsin, 1989
Master of Science in Information Technology Management-September 1997
and
Christine A. Mallory-Lieutenant, United States Navy
B.S., University of the State of New York, 1988
Master of Science in Information Technology Management-September 1997
and
David W. Safstrom-Commander, United States Navy
B.S., LeTourneau University, 1977
Master of Science in Information Technology Management-September 1997
Advisors: Tung X. Bul, Department of Systems Management
Geoffrey Xie, Department of Computer Science

The objective of the study is to propose a new learning medium, which takes advantage of the latest developments in computer based training (CBT) and the World Wide Web as an innovative mode for delivering education. The key research focus of this thesis is the design of the framework to best combine hypertext technology, computer-based training functionality's and interactive multimedia to enhance learning effectiveness. This research also focuses on the interactive multimedia to enhance learning effectiveness. Additionally, this research incorporates the migration and enhancement of a multiple criteria decision support textbook from print media to electronic media. Lessons learned from this development effort will be used to derive a general framework for developing integrated web-based CBT tools. A multimedia training module prototype developed during this research can be viewed at: (http://www.cimnet.nps.navy.com/coop).

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

DEVELOPING A WATERFRONT INTRANET
Curtis Corrigan Lenderman-Lieutenant, United States Navy
B.B.A., University of Oklahoma, 1989
Master of Science in Information Technology Management-September 1997
Advisor: Suresh Sridhar, Department of Systems Management
Second Reader: Rex Buddenberg, Department of Systems Management

The objective of this thesis is to describe in detail the reasoning and development of a Waterfront Intranet which serves the shore-based staff and its numerous and geographically dispersed ships. This thesis is intended to show how a Waterfront Intranet can provide access to all of the in-port ships and staff members via a World Wide Web browser. Jt will provide more open communication in the Destroyer Squadron, quicker and more consistent information flows (service) to the ships, and reduced time spent on the telephone handling repetitive and often simple information exchanges. This intranet will be a Destroyer Squadron information clearinghouse, providing all key staff members with a 24-hour a day forum. Personnel will be empowered by information availability and are likely to be more proactive and innovative in the pursuit of mission readiness. A prototype has been developed to demonstrate the concept. The prototype is located at (http:// venus.as.nps.navy.mil).

INTRANET FOR THE SYSTEMS MANAGEMENT DEPARTMENT
Edward D. Loewen-Captain, United States Army
B.B.A., Oklahoma University, 1987
Master of Science in Information Technology Management-September 1997
and
Robert H. Lunn-Major, United States Army
B.S., Texas Tech University, 1983
Master of Science in Information Technology Management-March 1998
Advisor: Suresh Sridhar, Department of Systems Management
Second Reader: Hemant Bhargava, Department of Systems Management

The objective of this thesis is to describe in detail the reasoning and development of an Intranet based decision support system. This thesis is intended to show how World Wide Web technologies can be used to develop a prototype Intranet that can provide access to information for faculty, students and staff members via a World Wide Web browser. It provides more open communication in the Department of Systems Management, quicker and more consistent information flows (service) to the faculty and staff, and reduced time spent on the handling of repetitive and often simple information exchanges. The decision support function is supported by a database which is an information clearinghouse, providing all personnel with 24-hour access. Personnel are empowered by information availability and are likely to be more proactive. A prototype has been developed to demonstrate the concept and to demonstrate the validity of rapid prototyping as a means of validating the effectiveness of the modified Intranet development methodology. The prototype is located at [http://131.120.41.236].

CASHLESS SHIPS: A FEASIBILITY STUDY
Carey M. Manhertz-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1987
Master of Science in Information Technology Management-September 1997
Advisor: Suresh Sridhar, Department of Systems Management
Second Reader: Rex Buddenberg, Department of Systems Management

The advent of mechanisms for facilitating electronic commerce has triggered widespread interest in several fields. However, research in electronic commerce to include Smart Card Technology has mainly focused on land-based transactions. This research investigates the role of Information Technology in facilitating electronic commerce at sea, aboard U.S. Navy ships. It determines the feasibility of replacing the current cash shipboard architecture with a cashless network providing real time accounting and banking applications. This research verifies the feasibility of cashless network systems aboard

ships with cashless mechanisms. The motivation for this research to provide and ensure monetary freedom to sailors at sea. This research evaluates the efficiency of cash processes using Commercial off the Shelf technologies. It also identifies workload demands through automated networks, and verifies seamless integration with cashless processes available commercially. A review is conducted of the existing shipboard cash systems. Then, the motivation for electronic commerce on ships is discussed. Two active prototype solutions are investigated. And finally, some of the lessons learned based on the experiences of these prototypes are summarized with a recommendation for the future.

WINDOWS NT THREATS AND VULNERABILITIES

Febbie P. Moore-Lieutenant, United States Navy
B.A., University of Mississippi, 1990
Master of Science in Information Technology Management-September 1997
Advisor: Norman Schneidewind, Department of Systems Management
Second Reader: Douglas Brinkley, Department of Systems Management

The objective of this research is to examine the threats and vulnerabilities of a Windows NT network. One aspect of this research is to add to the Department of Defense's understanding of the disadvantages of the system. This research demonstrates five vulnerabilities of Windows NT with respect to the military network operating system security environment. First, there is the NetBIOS-over-TCP/IP vulnerability. Windows NT by default allows networking over this protocol. This protocol could allow an attacker to remotely connect to a drive and edit the registry. Second, the server message block (SMB) vulnerability allows remote access to shared directories. An unauthorized user could use this hole to access everything on the shared resources. Third, the remote registry access vulnerability could allow an attacker to view and change the contents of another computer's Registry. Fourth, improperly set permissions could allow unauthorized access to sensitive and classified data. Fifth, the built-in file transfer protocol (FTP) service allows users to change directories. Users could use this hole to see the root directory. Before DoD becomes too committed to Windows NT, these issues need to be addressed.

AN INTRANET FOR THE SYSTEMS MANAGEMENT CURRICULAR OFFICE

Reece D. Morgan-Lieutenant, United States Navy
B.S., United States Naval Academy, 1989
Master of Science in Information Technology Management-September 1997
Advisor: Suresh Sridhar, Department of Systems Management
Second Reader: George Zolla, Department of Systems Management

Intranets are a recent development in information technologies which have provided a wealth of IS utility. "Intranet" refers to the use of World Wide Web technology to manage information within an organization—a self-contained Internet running on a LAN or WAN. Generally, the technologies used include web servers, browsers, hypertext transfer protocol (HTTP), hypertext markup language (HTML) pages, and search engines. Many organizations are now using or building intranets to distribute, collect, and share timely, consistent, and accurate information. The Systems Management (SM) Curricular Office at the Naval Postgraduate School presently relies on an inefficient paper-based system for distributing and collecting information from students. This thesis examines how an intranet can overcome the limitations of the current paper-based system. Rapid Application Development (RAD) methodology is used to conduct an analysis of current data flows and processes, and develop a working prototype of an intranet.

DEVELOPING CORE COMPETENCIES AND MEASURES OF EFFECTIVENESS FOR A NAVY MEDICAL CHIEF INFORMATION OFFICER

Thomas E. Moszkowicz-Lieutenant Commander, United States Naval Reserve
B.S. Pharmacy, University of Toledo, 1975
Master of Science in Information Technology Management-September 1997
Advisors: Barry Frew, Department of Systems Management
Mark Nissen, Department of Systems Management

While not all organizations benefit from the establishment of a Chief Information Officer (CIO), organizations that rely on information resources to accomplish their mission will gain a definite strategic advantage from developing an executive level position that can deal strategically with information technology and information resources. The Department of the Navy (DoN) medical department has established the position of CIO in a number of locations throughout the world. The purpose of this thesis is to use critical success factors to identify core competencies and skills essential for civilian medical CIOs and the core competencies and skills identified as essential for Department of Defense CIOs. By combining these two groups of core competencies and skills, this thesis develops a set of core competencies and skills necessary for a DoN medical department CIO. Additionally this thesis develops measures of effectiveness for the medical CIO in a DoN environment to gauge his effectiveness in contributing to the executive management of the organization.

AN AUTOMATED SPATIAL DECISION SUPPORT SYSTEM FOR THE RELOCATION OF ARMY RESERVE UNITS

Mark A. Murphy-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1982
Master of Science in Information Technology Management-March 1997
Advisors: Daniel Dolk, Department of Systems Management
George Thomas, Department of Systems Management

This research analyzes the process used to evaluate potential relocation sites for Army Reserve units from the perspective of military readiness. A comparative decision model (based upon Multi-Attribute Utility Theory), augmented by a Geographic Information System (GIS), was designed and implemented in an automated Spatial Decision Support System (SDSS). This SDSS provides a flexible structure that can be generalized to serve as an executable conceptual model for a wide range of decisions containing significant geographic or location-related components.

The Army Reserve Installation Evaluation System (ARIES) integrates several commercial software products in a seamless and synergistic manner. Data extracted from numerous large databases is spatially processed by a commercial mapping engine, and then overlaid onto a formal decision model. The decision maker can rely on a single, simplified interface that consistently applies the professional judgement of a panel of experts to produce standardized reports, or choose from a robust suite of methods for model management, sensitivity analysis, and the display of results. A process that previously required weeks can now be completed in minutes. More important, this approach improves the decision-maker's effectiveness by conveniently providing insights into the nature of the source data and the decision process.

SEANET REMOTE WIRELESS INTERNET PROJECT MANAGEMENT PLAN

Marko J.E. Nikituk-Captain, United States Army
B.S.E.E., United States Military Academy, 1986
Master of Science in Information Technology Management-September 1997
Advisors: Rex A. Buddenberg, Department of Systems Management
William J. Haga, Department of Systems Management

Ubiquitous computing, the ability to use computer resources anywhere and at anytime to accomplish tasks, is a capability that is in much demand. The Internet has provided an opportunity to meet this demand. However, access to the Internet is limited by connections to land-based wired systems. In order to truly achieve effective ubiquitous computing, technology must be developed that extends Internet access to remote and mobile platforms by using wireless access. The SEANET is a

proof of concept collaborative project seeking to extend Internet access to the sea for the Oceanographic Research Fleet. This thesis studies how the Internet evolved to draw lessons learned that can be applied to the development of SEANET. It also presents a possible method for more effectively meeting the SEANET goals through use of a Project Management Plan.

DEVELOPMENT AND APPLICATION OF A MULTIMEDIA ASSESSMENT TOOL
Daniel Nixon-Lieutenant, United States Navy
B.A., Auburn University, 1988
Master of Science in Information Technology Management-March 1996
Advisors: Anthony Ciavarelli, School of Aviation Safety
William Haga, Department of Systems Management

In the Naval Aviation community, interactive, multimedia computer-based training is being explored as a cost-effective alternative to traditional modes of training. This thesis develops an assessment tool for multimedia systems to be used in computer-based training by combining performance recommendations for multimedia hardware and software. It delivers a checklist for multimedia developers to assess the capability of proposed multimedia training systems.

CONCEPTUAL DESIGN OF A CYBERNETIC INFORMATION SYSTEM FOR COMMAND AND CONTROL
N. Michael Oluvic-Lieutenant, United States Navy
B.S., United States Naval Academy, 1991
Master of Science in Information Technology Management-September 1997
Advisor: Nelson D. Ludlow, Department of Computer Science
Second Reader: Hemant K. Bhargava, Department of Systems Management

This thesis argues a case for focusing command and control efforts more towards conflict deterrence vice conflict resolution and proposes a conceptual design for a command and control system to accomplish this paradigm shift. It also addresses the issue of shortening the Observe, Orient, Decide, Act (OODA) Loop of a decision-maker to enhance control while disrupting an adversary's control of a situation. Accomplishing these goals requires some method to handle the overabundance of data available for processing and analysis.

The proposed system would use advanced, but existing, information technology, incorporating cybernetic models, to enhance a decision-maker's control process. It does this by collecting, processing, and fusing all-source data for presentation to a decision-maker. Natural Language Processors categorize, filter, and fuse relevant data while advanced visualization engines display that data in a way that improves a decision-maker's ability to rapidly assimilate information, and increase knowledge and understanding.

This thesis shows that using cybernetic models, and advanced Artificial Intelligence tools, a design exists that could help increase understanding and control by improving the decision-making process and shortening the decision-maker's OODA Loop.

EXIT STRATEGY IN THE IMPLEMENTATION OF INFORMATION TECHNOLOGY SYSTEMS
Todd W. Pugh-Lieutenant, United States Navy
B.S., The Citadel, 1988
Master of Science in Information Technology Management-September 1997
Advisors: William J. Haga, Department of Systems Management
Barry Frew, Department of Systems Management

This thesis proposes that planning for the implementation of information technology projects include an exit strategy. The military origins of exit strategy are reviewed along with corporate formulations of exit strategies in plans for non-

technology investments. Cultural, political and organizational barriers to exit strategy are considered. Suggestions are made for further research.

OBJECT-ORIENTED PLAN REPRESENTATION FOR THE OMWG C2 OBJECT SCHEMA
Robert M. Reeves-Lieutenant, United States Navy
B.S., United States Naval Academy, 1989
Master of Science in Information Technology Management-March 1997
Advisors: Dan Boger, Command, Control, and Communications Academic Group
Tung Bui, Department of Systems Management

The purpose of this thesis is to examine current Command and Control planning methods and to aid in the furtherance of the Object Model Working Group's (OMWG) Core Plan Representation. Chapter I introduces the discipline of planning and its history. Chapter II discusses the theory and practice of modem Object-Oriented modeling. The structure and conventions of object programming are covered as well as a method for information system abstraction. Chapter III covers the background of current Command and Control systems and gives a report on the OMWG efforts in creation of an Object Schema for Command and control. Chapter IV presents the author's submission for an Object-Oriented representation of the COMSUBPAC OPLAN 5050 based on the Core Plan Representation (CPR).

AN ANALYSIS OF QUALITY OF SERVICE OVER
THE AUTOMATED DIGITAL NETWORK SYSTEM
Brian D. Rehard-Lieutenant, United States Navy
B.S., Ohio State University, 1989
Master of Science in Information Technology Management-September 1997
Advisor: Rex Buddenberg, Department of Systems Management
Second Reader: Suresh Sridhar, Department of Systems Management

With the implementation of the Automated Digital Network System (ADNS), the United States Navy has significantly expanded its communication capabilities. However, as ADNS is installed throughout the Fleet, and bandwidth-hungry applications such as video teleconferencing become more popular, network congestion will become a larger and larger problem. Specifically, network congestion will cause a slow down in delivery of all traffic. Applications with hard, real4ime requirements for data delivery, which treat late message packets as lost packets, will begin to lose data. This thesis will explore the message priority setting and congestion handling functions of ADNS, pointing out inadequacies during congested conditions which may lead to data losses. It will then go on to introduce Quality of Service (QoS) standards being developed by the Internet Engineering Task Force (IETF). These QoS standards are implemented by reservation protocols to provide deterministic service over networks regardless of network loading. Finally this thesis will introduce the Resource Reservation Protocol (RSVP) as a means to implement QoS over ADNS, allowing privileged applications to enjoy deterministic service over the network at any time or under any conditions of network loading.

MODEL MANAGEMENT VIA DEPENDENCIES BETWEEN VARIABLES:
AN INDEXICAL REASONING IN MATHEMATICAL MODELING
Devrim Rehber-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, 1990
Master of Science in Information Technology Management-March 1997
Advisors: Hemant K. Bhargava, Department of Systems Management
Gordon H. Bradley, Department of Operations Research

The design and implementation of computer-based modeling systems and environments are gaining interest and importance in decision sciences and information Systems. In spite of the increasing popularity of GUI-based operating systems, most of the algebraic modeling languages, today, are still file-oriented, text-based, and therefore require structured declara-

tions and formal model definitions. The utilization of the standard graphical screen objects of a graphics-based operating system provides enhanced visualization of models and more cohesive human-computer interaction.

The approach taken in this thesis is to explore the design and implementation of a graph-based modeling system focusing on computational dependencies between model components. Another important aspect of this research is the development of a user-friendly model formulation interface for algebraic modeling languages and systems; these facilitate the description and implementation of mathematical models by allowing the modeler to employ commonly known and powerful algebraic notation instead of language specific codes.

The major conclusion of this thesis is that dependencies between variables are a useful foundation for building and using models and modeling languages. It also shows that this supports model documentation, validation, formulation, implementation, comprehension, maintenance and reuse. That is, it impacts nearly every step of the modeling life cycle.

INTRANET TECHNOLOGY: CONSIDERATIONS FOR IMPLEMENTATION WITHIN THE DEPARTMENT OF DEFENSE

Oliver E. Rich, Jr.-Lieutenant, United States Navy
B.S., Parks College, 1989
Master of Science in Information Technology Management-March 1997
and
Valerie S. Rich-Lieutenant Commander, United States Navy
B.S., Laura Spelman College, 1986
Master of Science in Information Technology Management-March 1997
Advisors: Frank Barrett, Department of Systems Management
Nancy Roberts, Department of Systems Management

Intranets, internal networks based on the same technology and protocol as the World Wide Web, have emerged in the past two years as a very popular medium for communication and information exchange within organizations. Organizations are flocking to this new tool in order to maintain or improve their market share and enhance communications and productivity. The purpose of this thesis is to give the DoD some guidance in deciding if this new wave of technology is suitable for its computing and information environment. A qualitative approach is used in obtaining the data for this thesis. The primary assumption of this research is that the introduction of an intranet is similar to the introduction of any information system. Therefore, a sample of information technology professionals with at least five years experience in planning, developing, managing, and implementing information systems within DoD or large, bureaucratic, and hierarchical organizations is interviewed. The interviews reveal a process of implementation that is heavily dependent on variables such as culture, structure, and size of the organization. The process has four major phases: leadership buy-in, prototype introduction, attainment of critical mass, and intranet refinement. The authors conclude that intranet technology creates the opportunity for the DoD to become more productive and more efficient. They note that the real test for DoD implementors is in the application of the technology.

A METHODOLOGY FOR IMPROVING THE USABILITY OF THE ANVIS/HUD COMPUTER BASED TRAINER

Daniel R. Rozelle-Lieutenant Commander, United States Navy
B.A., Findlay College, 1985
Master of Science in Information Technology Management-March 1997
Advisors: Anthony Ciavarelli, School of Aviation Safety
William Haga, Department of Systems Management

Computer software has taken an increasingly larger role in the U.S. Navy. It is used in nearly every facet of naval operations, from administrative chores to controlling complex weapons systems. Because of the high cost of software and the potential for inadvertent misuse, it is important that software be easy to use and understand. This thesis explores the methods and techniques available for conducting software usability evaluations. Using one of the methods described in this thesis, actual software usability testing is done on a recently developed computer based training (CBT) program. The CBT

program evaluated in this study is designed to instruct helicopter pilots in the use of the AN/AVS-7 ANVIS/HUD. The device is an advanced night vision goggle system that is comprised of the AN/AVS-6 ANVIS night vision goggle (NVG) set and a Heads-Up Display (HUD). This thesis describes the usability test conducted on the ANVIS/HUD CBT and establishes a methodology that can be used, not only on future versions of the ANVIS/HUD CBT, but on other PC oriented software. The result of this usability test show that improvement can be made to the navigation method used by the CBT and the presentation of instructional material.

THE DESIGN AND INSTALLATION OF A GLOBAL BROADCAST SERVICE DEMONSTRATION PROJECT AT THE NAVAL POSTGRADUATE SCHOOL

Keith E. Schaffler-Lieutenant, United States Navy
B.S., Clarkson University, 1987
Master of Science in Information Technology Management-March 1997
Advisors: Paul H. Moose, Department of Electrical and Computer Engineering
Rex Buddenberg, Department of Systems Management

The author presents a detailed description of the design and installation of a Global Broadcast Service (GBS) demonstration and evaluation project at the United States Naval Postgraduate School. GBS is a Department of Defense CONUS-based Direct Broadcast Satellite (DBS) evaluation project utilizing commercial, off-the-shelf components for the reception of video, Internet Protocol (IP) and Asynchronous Transfer Mode protocol (ATM) data transmission. Direct Broadcast Satellite technology offers enormous digital relay capability with data transmission speeds on the order of 30 Mbps being available on a single satellite transponder. As modern computer and communications devices now employed by each of the armed services need access to wideband data channels to effect efficient and timely communications, this capacity has generated significant interest within the DoD. The author discusses several key DBS technical areas, including video compression methods, data throughput capacity, polarization, and frequency biasing. Proper installation techniques and suggestions are presented, in addition to other useful DBS-related material. Many significant difficulties experienced during design, installation, and initialization of the NPS testbed are discussed in detail. The author presents this information to help subsequent GBS project participants decrease the time required to design, procure, and install a semi-permanent GBS receive suite.

A RELATIONAL DATABASE MODEL AND DATA MIGRATION PLAN FOR THE STUDENT SERVICES DEPARTMENT AT THE MARINE CORPS INSTITUTE

Aaron Tory Slaughter-Major, United States Marine Corps
B.A., Tulane University, 1986
Master of Science in Information Technology Management-September 1997
Advisor: Magdi N. Kamel, Department of Systems Management
Second Reader: Suresh Sridhar, Department of Systems Management

Today's business environment in the Department of Defense (DoD) demands that managers possess a clear understanding of the design, implementation, and maintenance of the databases used to store, organize, manipulate and return data.

In response to shortcomings identified in their current legacy information system, the Marine Corps Institute (MCI) initiated a project to migrate from a file processing database system to a relational database using a client/server system based on an open hardware and software architecture.

This research provides a relational data model and migration plan in response to MCI's request. It investigates data modeling and database design using the Integration Definition for Information Modeling (IDEFlX) methodology and the relational model. It also addresses the migration of data and databases from legacy to open systems. The application of the IDEF1X model, supported by CASE tools to facilitate data modeling and database maintenance, reveals strategies for dealing with the complex issues of database design, migration, and maintenance in DoD.

MANAGEMENT OF AUTONOMOUS SYSTEMS IN THE NAVY'S AUTOMATED DIGITAL NETWORK SYSTEM (ADNS)

James A. Sullivan-Lieutenant Commander, United States Navy
B.E., State University of New York, Maritime College, 1984
Master of Science in Information Technology Management, September 1997
Advisors: Rex A. Buddenberg, Department of Systems Management
Suresh Sridhar, Department of Systems Management

In an effort to create a more efficient, interoperable communications environment for its ships at sea the Navy has developed the Automated Digital Network System. Because of its recent introduction into the fleet and the evolving nature of the program there has not yet been any high level operational guidance provided for communications planners and managers. The major contribution of this thesis is to describe key issues fundamental to successful mission accomplishment. Operating in a network-centric environment represents a conceptual departure from standard Navy at-sea communications methods. The changes in thinking necessitated by this departure are presented to highlight the need for a new approach to communications management. Analysis of program design and implementation yielded the framework for the outline of system requirements and the management considerations necessary for effective operational employment. Reviews of fundamental concepts underlying the system and program origins are provided as background material.

RECYCLING DECISION SUPPORT SYSTEM: DESIGN AND DEVELOPMENT OF A WEB-BASED DSS

Clayton G. Tettelbach-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Information Technology Management-March 1996
Advisor: Hemant K. Bhargava, Department of Systems Management
Second Reader: Suresh Sridhar, Department of Systems Management

The explosive growth of the World Wide Web creates new opportunities for the development and deployment of Decision Support Systems. No longer restricted by machine-specific limitations, Web-based Decision Support Systems (DSS) provide global access to widely diversified and geographically dispersed users through sharing of data, models, algorithms, and modeling environments. This thesis examines the design and development processes involved in the creation of a Web-based DSS.

The Recycling Decision Support System utilizes a rapid prototype and refinement process to create a Web-based system focusing on supporting ordinary people and industrial users in making good decisions for recycling and disposal of household and industrial waste. Through abstraction of details from the specific Web-based DSS design, a generalized framework for supporting decision-making via the WWW is built which supports functionality in education, queries, and analysis of complex problems.

An important aspect of this research is the development of a new architecture which conforms to the complexities specific to Web-based Decision Support Systems. Prompted by the additional interactions required for WWW connectivity, this architecture incorporates agents for negotiating transactions between the functional components of a standard DSS.

ECONOMIC EVALUATION OF VOICE RECOGNITION (VR) FOR THE CLINICIANS' DESKTOP AT THE NAVAL HOSPITAL ROOSEVELT ROADS (NHRR)

Erik Threet-Lieutenant, United States Navy
B.S., University of Central Arkansas, 1987
M.B.A., City University, 1991
Master of Science in Information Technology Management-September 1997
Advisors: Monique P. Fargues, Department of Electrical and Computer Engineering
William R. Gates, Department of System Management

Beyond keyboards, mice, trackballs, and other means to communicate with computers, the spoken word remains the ultimate, if not elusive, user interface. Recent developments in hardware and software have brought the ability to control a computer with the spoken word closer to reality. This thesis investigates the current status of VR technology, its use in support of Joint Vision 2010, its use in the Healthcare environment and provides an analysis of the VR Pilot Project at NHRRs. The objective of the analysis is to determine the viability and economical benefits of using a commercial-off-the-shelf (COTS) VR application as a clinicians input device for transcribing clinical encounter (SOAP) notes. The VR application used in this study was the DragonDictate Classic Edition with the DragonMed add on module for healthcare professionals.

The results show that VR technology is a viable tool that can add numerous economical benefits, such as, a decrease in the time clinicians spend transcribing SOAP notes, eliminates the need to hire medical transcriptionists and reduces Graphical User Interface (GUI) overload for Window's based Navy Medical Standard systems. In addition, findings indicate that the use of computer technology, during clinical encounters, has no significant effect on patient/clinician relationships.

AN INVESTIGATION OF THE EXPECTED IMPACT OF THE SPACE BASED INFRARED SYSTEM (SBIRS) ON CUEING OF NAVY THEATER BALLISTIC MISSILE DEFENSE SHIPS(U)

Paul J. Treutel-Lieutenant Commander, United States Navy
B.S., University of Southern Mississippi, 1985
M.B.A., Chaminade University, 1992
Master of Science in Information Technology Management-March 1997
Advisors: Dan C. Boger, Command, Control, and Communications Academic Group
Carl R. Jones, Department of Systems Management

This thesis studies tactical ballistic missile (TBM) position and velocity measurement accuracy available from the current Overhead Non-Imaging Infrared (ONIR) Defense Support Program (DSP) space-based sensors, and compares this measurement accuracy with the measurement accuracy improvements expected from the Space Based Infrared System (SBIRS). SBIRS is to replace the existing space-based sensors in the near future. The analysis is motivated by a requirement to improve the lethality of AEGIS class ships performing a defended area theater ballistic missile defense (TBMD) mission or a theater-wide TBMD mission.

TBM position and velocity measurements from space-based IR sensors can be handed off to the AEGIS TBMD ship as cueing information which enables earlier acquisition of the TBM by the shipboard AN/SPY-1B/D phased array radar. Earlier acquisition can enable earlier engagement and intercept of the missile at a greater distance from the ship. An analysis of the factors that introduce ONIR space sensor measurement error to the current satellites is performed and used as a baseline for comparison with the design approach and measurement improvements offered by the SBIRS spacecraft and ground processing stations. The result is investigated within the context of lethality improvements to the AEGIS TBMD ship against TBMs of various ranges.

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

PROCESS IMPROVEMENT TO THE INSPECTION READINESS PLAN IN CHEMICAL WEAPONS CONVENTION CHALLENGE INSPECTIONS

William M. Triplett-Lieutenant, United States Navy
B.S., United States Naval Academy, 1989
Master of Science in Information Technology Management-September 1997
Advisors: James J. Wirtz, Department of National Security Affairs
William J. Haga, Department of Systems Management

This thesis identified current Information Technology initiatives to help improve the Navy's Inspection Readiness Plan for Chemical Warfare Convention (CWC) Challenge Inspection. The CWC is an intrusive inspection. The Challenge Inspection allows for a team of international inspectors to inspect a naval facility suspected of violating the CWC on very short notice

This thesis begins with a review of the CWC Challenge Inspection timeline. It then describes the Navy's Inspection Readiness Plan for CWC Challenge Inspections as well as the Navy Tiger Team that is sent to naval facilities to assist the Commanding Officer and base personnel during inspections. One of the initiatives evaluated by this analysis is the use of videoconferencing. To ascertain the feasibility of using videoconferencing in the CWC Challenge Inspection process, this thesis reviews the current videoconferencing systems and standards, and the results of a questionnaire that was sent to various naval commands. This thesis concludes with recommendations for inclusion of videoconferencing and various other Information Technology initiatives in the CWC Challenge Inspection process.

INSTRUMENTING THE NAVAL POSTGRADUATE SCHOOL GLOBAL BROADCAST SERVICE TESTBED FACILITY

John A. Watkins-Lieutenant, United States Navy
B.A., University of San Diego, 1990
Master of Science in Information Technology Management-June 1997
Advisors: Paul H. Moose, Department of Electrical and Computer Engineering
Carl R. Jones, Department of Systems Management

The work reported in this thesis used readily available components to implement a data acquisition system for a Global Broadcast Service Testbed data collection facility. Use of hardware with controlling software is necessary to collect signal power content of satellite signals at a given distance from the transmitting source. Precise measurement and calibration of a satellite receive signal is accomplished by use of an Hewlett-Packard 8568B spectrum analyzer. A personal computer is used to collect and store retrieved data. These components are brought together using LabVIEW instrumentation software. This system provides an efficient means to collect signal data which can be used to verify satellite link performance estimates. Calculations are performed using Matlab statistical analysis software. This thesis contains calculated and measured values of total average carrier power and background noise levels for the three satellite receive systems that comprise the Naval Postgraduate School Global Broadcast Service Testbed facility.